CHEMICAL NOTES ON ATOXYL

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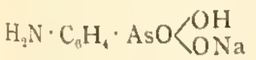
The following is a record of chemical observations made during the last two and a half years whilst working on the chemical constitution and physiological action of Atoxyl.

Water of crystallisation.—The differences in the amount of arsenic found in samples of Atoxyl due to the differences in the water of crystallisation (Moore, Nierenstein and Todd,[1] Ehrlich and Bertheim,[2] and others), suggested an exact estimation of the water of crystallisation and 'adhering moisture.' Experiments have proved that Atoxyl contains from one half to one and a half molecules of adhering moisture, and exactly two molecules of water of crystallisation. Further observations showed that Atoxyl loses the adhering moisture in about *five weeks* when standing over concentrated sulphuric acid; after this time no further loss of weight could be noted in the course of six months. It contains, then, two molecules of water of crystallisation which are only lost on drying for three hours at 160° C. Atoxyl, after having been kept over sulphuric acid for at least five weeks, has, therefore, the formula:—



$$H_2N \cdot C_6H_4 \cdot AsO\begin{cases}OH\\ONa\end{cases} + 2\,H_2O$$, corresponding to 23·88% arsenic.

Therefore, in order to administer always the same amount of arsenic in a given dose of Atoxyl, it is advisable that Atoxyl should be kept in a dark desiccator over concentrated sulphuric acid for at least five weeks before use. The dark desiccator ought to be used on account of the decomposition of Atoxyl solutions when exposed to light for some time.

Inorganic arsenic.—Two distinct brands of Atoxyl manufactured by the Vereinigte Chemische Werke, Charlottenberg, have been supplied to us since 1905; one having the appearance of a white powder, the other of distinct crystals. It was found that the powder contained free inorganic arsenic (from 0·4 to 0·9%), which is easily detected by passing H_2S into the *slightly* acidified solution. The crystalline Atoxyl did not contain any inorganic arsenic.

Parafuchsin.—On two occasions it was noticed that the freshly prepared solution of Atoxyl was of a red colour; this was due to the presence of parafuchsin, which is formed as a by-product during the preparation of the drug.

Yellow Atoxyl.—One special supply of Atoxyl sent out to Uganda gave rise, in the hands of Captain A. C. H. Gray,[3] on injection, to violent toxic symptoms and blindness. The qualitative examination of the drug showed that it dissolved in strong alkali (40% KOH) with a yellow colour; this colour reaction has never been observed by us in any other sample of Atoxyl. This Atoxyl contained free inorganic arsenic, traces of free anilin, and a second substance which is probably an oxidation product of Atoxyl. It is quite possible that this substance may be responsible for the untoward effects.

Therefore, it would seem advisable that Atoxyl should be tested with strong alkali before use. 1 c.c. of a 5% solution should be mixed with 2 c.c. of strong alkali and left standing for a few minutes, and if the solution shows a yellow coloration the Atoxyl should not be used for treatment.

A full chemical report on the 'yellow Atoxyl' has previously been published.[3]

LITERATURE

1. B. Moore, Nierenstein and Todd. Bio-chemical Journal, Vol. II, 1907, p. 300.
2. Ehrlich and Bertheim. Berichte d. deutschen chemischen Gesellschaft, Vol. 40, p. 3296
3. A. C. H. Gray. Quarterly Report on the Progress of Sleeping Sickness and Medical Treatment of Sleeping Sickness in Uganda, 1908, pp. 32 and 35.